Reverse Osmosis & Desalination

What is it?
Reverse Osmosis (RO) is potentially a low-energy method to produce fresh water for sailor consumption and machinery needs. The RO system consists of two layers of filtration: one to remove the particulate matter and one to remove the dissolved salts.

Description
RO uses hydraulic pressure to force fresh water through a semi-permeable membrane, leaving concentrated salt water behind. The RO system also removes particulate matter from seawater, providing fresh water in both turbid water as well as the open ocean.

Although RO is a tremendous energy savings when compared with distillation techniques, additional efforts are ongoing to improve the system through optimization of energy requirements and longer-lasting, higher-performance components. Several of these new efforts include energy recovery from the rejected brine stream, membrane prefiltration for enhanced operation in shallow water, and improved environmental stewardship through the reduction of replaceable parts.

Benefits
Current shipboard reverse osmosis based desalination systems offer significantly higher operational availability and increased energy efficiency compared to shipboard distillation systems. Research efforts into energy recovery, advanced reverse osmosis membranes and membrane based prefiltration techniques offer the potential for improvements to shipboard RO such as more compact systems, significantly increased energy efficiency, reduced maintenance, and the ability to treat turbid sea water.

What Will it Accomplish?
Newer Reverse Osmosis systems, such as those being developed in the Office of Naval Research (ONR) Advanced Shipboard Desalination FNC program, use advanced prefiltration which will allow increased capability to purify water from turbid feed water and have energy recovery devices which help the systems use about 65% less energy than current RO shipboard systems and up to 85% less energy than current shipboard desalination systems.

At a Glance

How Does it Work?
Reverse Osmosis uses hydraulic pressure to force fresh water through a semi-permeable membrane, while the remaining brine is rejected overboard.

Metrics
- Improved capability to purify water from turbid seawater sources
- Significantly increased energy efficiency
- Decreased maintenance and manning

Applications
- Surface Combatants
- Submarines
- Amphibious
- Carriers
- Auxilliary

For More Information
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